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| EXAMINER | |
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| HARVEY, DIONNE | |

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# BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

MAILED

FEB 0 4 2005

Technology Center 2600

Application Number: 09/464,867
Filing Date: December 16, 1999
Appellant(s): SCHOTT, WAYNE M.

Edward W. Goodman
For Appellant

# EXAMINER'S ANSWER

This is in response to the appeal brief filed November 01, 2004.

***(1) Real Party in Interest***

A statement identifying the real party in interest is contained in the brief.

***(2) Related Appeals and Interferences***

A statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

***(3) Status of Claims***

The statement of the status of the claims contained in the brief is correct.

***(5) Summary of Invention***

The summary of invention contained in the brief is correct.

***(6) Issues***

The Appellant's brief presents no statement of the issues.

***(7) Grouping of Claims***

The rejection of claims 1-20 stand or fall together because appellant's brief does not include a statement that this grouping of claims does not stand or fall together and reasons in support thereof. See 37 CFR 1.192(c)(7).

***(8) Claims Appealed***

The copy of the appealed claims contained in the Appendix to the brief is correct.

***(9) Prior Art of Record***

| | | |
|---|---|---|
| JP 4-301998 | TAMURA | 10-1992 |

***(10) Grounds of Rejection***

The following ground(s) of rejection are applicable to the appealed claims:

Claims 1-20 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over TAMURA (JP 4-301998).

***<u>Under U.S.C. 102(b):</u>***

*Regarding claims 1,2,6,7,11 and 16,*

TAMURA teaches a loudspeaker comprising an enclosure (1); transducer (3); internal vent i.e., first means (6); first external vent i.e., second means (7) and second external vent i.e., third means (8); the ratio of the acoustic mass of the internal vent to the second external vent being <u>*approximately*</u> 3/1 to 7/1, as broadly claimed; and the ratio of the acoustic mass of the first external vent to the second external vent being <u>*approximately*</u> *15/*1 to 30/1, as broadly claimed.

*Regarding claims 3, 8, 13 and 18,*

TAMURA teaches that the ratio of the first sub-chamber to the second sub-chamber is in a range of <u>*approximately*</u> 0.3 to 2.5, as broadly claimed.

*Regarding claims 4,5,9,10,14,15,19 and 20,*

TAMURA teaches that the cone (3) has a front surface in communication with a first sub-chamber (4) and rear surface in communication with the second sub-chamber (5).

***<u>Under U.S.C. 103(a) and interpreted in a different manner:</u>***

*Regarding claims 1,2,6,7,11 and 16,*

TAMURA teaches a loudspeaker comprising an enclosure (1); transducer (3); internal vent/first means (6); first external vent/second means (7) and second external vent/third means (8). TAMURA teaches that " a passive radiating means depending on acoustic quantity is provided" and thereby teaches that the acoustic masses i.e., "acoustic quantity" of said vents i.e., "passive radiating means" is not restricted to any particular value. TAMURA does not clearly teach that the chosen values yield a ratio of the acoustic mass of the internal vent to the second external vent which is *specifically within the range* of 3/1 to 7/1, or that the ratio of the acoustic mass of the first external vent to the second external vent is *specifically within the range of 15/1* to 30/1.

However, since TAMUAR teaches that the acoustic mass of the vent means may be adjusted, and does not restrict to having any particular acoustic mass, it would have been obvious for one of ordinary skill in the art at the time of the invention to provide vents with different acoustic masses i.e., lengths and/or cross sections, for the purpose of "tuning" the frequency response of the acoustic device to that which is desirable. Additionally, it is well known in the art that the size of the passive acoustic radiator i.e., port, vent etc., taken in combination with the size of the sub-chamber(s) will determine the degree of attenuation of the output of the acoustic vibrations from the driver unit. (Pertinent references have been provided, below.)

*Regarding claims 3, 8, 13 and 18,*

TAMURA fails to specifically teach that the ratio of the first sub-chamber to the second sub-chamber is *specifically within the range of* 0.3 to 2.5. However, as discussed above, it would have been obvious to one of ordinary skill in the art at the time of the

invention to provide sub-chambers having different volumes, for the purpose of "tuning" the frequency response of the acoustic device.

*Regarding claims 12 and 17,*

Referring to the figure provided by TAMURA, the first means (6), second means (7) and third means (8) are of varying acoustic masses. TAMURA teaches that the first means, second means, and third means, each, are defined by tubular structures. The interior of each tubular structure defining an air volume, thereby reading on "acoustic masses". TAMURA's teaching thereby reads on "wherein, the first means, second means, and third means have respective first, second and third acoustic masses."

*Regarding claims 4,5,9,10,14,15,19 and 20,*

TAMURA teaches that the cone (3) has a front surface in communication with a first sub-chamber (4) and rear surface in communication with the second sub-chamber (5).

***(11) Response to Argument***

***<u>With respect to the arguments regarding the 35 U.S.C. 102(b) rejection:</u>***

Appellant argues that the Examiner is mistaken in her interpretation of the claim's recitation of "approximately" as failing to distinguish the immediate invention from that which is taught by TAMURA JP 4-301998. Appellant further argues that "since the Examiner did not reject the claims as being indefinite... then, the Examiner could not then completely ignore the approximate ranges of the claims when examining the same with regard to the prior art."

While the Examiner has not found it necessary to reject the Appellant's claims as being indefinite in their recitation of the term "approximately", the Examiner is of the opinion that an "approximate" range is a broad limitation, which leaves to the Examiner the burden of establishing the meets and bounds of said "approximate" range.

The Examiner has not, as argued, completely ignored the approximate ranges of the claims. In fact, the Examiner has interpreted an "approximate" range as being anticipated by TAMURA for the following reasons:

Appellant's claims are drawn to a loudspeaker comprising an internal vent having an acoustic mass and a second external vent also having and acoustic mass, wherein the ratio of the acoustic mass of the internal vent to that of the second external vent is in a range of approximately **3/1 to 7/1**, hereafter referred to as an "approximate" range. Similar recitations are contained within **claims 3, 6, 8,11,13, 16 and 18.**

Before fairly applying a prior art reference as anticipatory to said limitations, the Examiner must first be able to define that which constitutes the "approximate" range, in question.

The Appellant's invention is not limited to having a ratio which falls strictly within the **3/1 to 7/1** range. As claimed, the Appellant's invention comprises even those loudspeaker structures wherein the ratio of acoustic mass for the internal vent to the second external vent, falls outside of the range of **3/1 to 7/1**. Considering a hypothetical range of "**2/1**", if explicitly taught by TAMURA, would such a ratio fairly anticipate the "approximately 3/1 to 7/1" limitation of the claim? If so, would not the same hold true for a ratio of **1/1** or even **8/1**, and so on and so forth. Without properly establishing the meets and bounds

of an "approximate" range, the Examiner has duty to give said claim limitations the fairest yet broadest interpretation. Since **figure 3** of TAMURA clearly teaches a plurality of vents, all of which being of varying dimensions, it is apparent that some ratio exists between the acoustic mass of the internal vent (6) and the acoustic mass of second external vent (8). The Examiner maintains that interpreting that ratio which is illustrated in **figure 3** of TAMURA as falling within the non-existent meets and bounds of an "approximate" ratio, is fair.

In response to applicant's argument that: The Appellant's Invention Is Concerned With A Loudspeaker With Appreciable Improvement In The Acoustical Output Over A Reasonably Broad Operating Band, Which Is In Contrast With TAMURA Which Discloses A Narrow Band.

Though TAMURA may be concerned with a different issue, a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim.

***With respect to the arguments regarding the 35 U.S.C. 103(a) rejection:***

In response to applicant's argument that by arranging the acoustic mass of the vents of the TAMURA reference such that the ratio of the acoustic mass of the internal vent to the acoustic mass of the second external vent to be as claimed in claim 1 or in

claim 6, one would be achieving the opposite from which TAMURA is seeking i.e., TAMURA lacks motivation:

In the 'Abstract' portion, TAMURA teaches "a passive radiating means depending on acoustic quantity is provided..." where "passive radiating means" refers to vents **6, 7 and** 8, and where "depending on acoustic quantity" refers to the a variable acoustic mass for said vents, TAMURA thereby recognizes a need in the art for varying the acoustic masses of said vents for communicating with an external area, as well as the acoustic quantity of first and second cavities **4 and 5.** Furthermore, pertaining to Claim 1 and Claim 6, the Appellant argues that by in altering TAMURA "virtually the opposite from which TAMURA is seeking is achieved, i.e., a relatively broad operating band (as opposed to a narrow low frequency band)". However, the argued limitation "broad operating band" is not recited in Claim 1 or Claim 6.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

D.N.H.
January 19, 2005

Conferees

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PTO 2005-1959

Japanese Kokai Patent Publication No. H4-301998, published October 26, 1992; Application No. H3-89460, filed March 28, 1991; Inventor: Kunihiko TAMURA; Assignee: Nippon Koromubia KK [Nippon Columbia, Ltd.]

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# SPEAKER BOX

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[Claim]

[Claim 1]

Speaker box characterized in that, with a speaker box having an enveloping means whereby a first and second cavity are provided in front of and in back of the radiation surface of the speaker and envelop the aforementioned speaker; a first passive radiation means provided on the first cavity, which is characterized by the acoustic mass connected to the outer regions of the aforementioned respective cavities; and a second passive radiation means provided on the second cavity; the aforementioned first and second cavities are connected based on the acoustic mass.

[Detailed Explanation of the Invention]

[0001]

[Field of Use in Industry]

The present invention concerns a speaker box which plays back mainly low-region frequencies; in particular, it concerns a speaker box which improves performance and unevenness in low-region playback frequencies.

[0002]

[Prior Art]

Figure 7, an abbreviated structural drawing, shows a conventional low-region

playback general speaker system. With this system, cavities (4, 5) are respectively provided on the front and back of the radiation surface of a speaker unit (3), ducts (7, 8) externally connected to the respective cavities (4, 5) are provided and are caused to resonate; sound is effectively radiated, and this is disclosed in Japanese Kokai Patent Publication No. S60-98793 [published in 1985].

[0003]

[Problems the Invention is Meant to Resolve]

However, with the prior art technology described above, with the resonance frequency of the passive radiation means such as the ducts and the like, displacement of the diaphragm of the speaker is minimized, but with lower frequencies, displacement of the diaphragm suddenly increases. Therefore, the wiring system regions such as the support systems, driving systems, and the like of the diaphragm are exceeded and the saturation regions of both the positive and negative sides are attained; in particular, odd-number harmonic waves such as third harmonic waves increase rapidly. Because the odd-number harmonic waves form consonant sounds with respect to fundamental tones, they are easily detected audibly as distortions, and there has been the problem that the allowable input has been small in practicality.

[0004]

[Problems the Invention is Meant to Resolve]

Therefore, the present invention is characterized in that, with a speaker box having an enveloping means whereby a first and second cavity are provided in front of and in back of the radiation surface of the speaker and envelop the aforementioned speaker; a first passive radiation means provided on the first cavity, which is characterized by the acoustic

mass connected to the outer regions of the aforementioned respective cavities; and a second passive radiation means provided on the second cavity; the aforementioned first and second cavities are connected based on the acoustic mass.

[0005]

[Operation]

Thus, at a frequency that is lower than the lower resonance frequency from among the resonance frequencies of the first and second radiation means, inertance is decreased based on the acoustic mass connecting the first and second cavities and becomes a bypass circuit. Because this acts to counteract the sound pressure in the speaker box, the sound pressure and distortion in the playback-unnecessary bands can be reduced.

[0006]

[Embodiment]

Figure 1 is an abbreviated compositional drawing showing an embodiment of the present invention. In the drawing, there is a speaker installation plate (2) which divides the inside of the speaker box (1). A first cavity (4) is formed on the front side of the radiation surface of the speaker unit (3), and a second cavity (5) is formed on the back side thereof. On the speaker installation plate (2), a speaker unit (3), which completely cuts off the front and back cavities, and a duct (6) are installed. On the first cavity (4) and second cavity (5), the central axes of the respective ducts (7, 8) and the central axis of the speaker unit (3) are installed unevenly so that they do not coincide. This makes the high-region attenuation factors satisfactory.

[0007]

Figures 2 through 4 are used to explain the operation of the speaker box (1), based

on the composition described above. Figure 2 shows the direction of the air flow inside the ducts (6, 7, 8) with respect to the momentary displacement of the diaphragm of the speaker unit (3) during resonance (resonance frequency foa) based on the acoustic mass whereby the acoustic mass of the duct (7) and the acoustic mass of the duct (6) coincide, and the cavity (4).

[0008]

As shown in the drawings, when there is displacement (direction of the arrow) at the front of the diaphragm of the speaker unit (3), the air in the ducts (6, 7) during resonance (foa) based on the acoustic mass whereby the acoustic mass of the duct (7) and the acoustic mass of the duct (6) coincide, and the cavity (4) acts in the direction where the air flow into the cavity (4) in the direction opposite the displacement direction of the diaphragm. At this time, inside the duct (8), because of the fact that this is removed from the resonance frequency (fob) based on the acoustic mass whereby the acoustic mass of the duct (6) and the acoustic mass of the duct (8) coincide, and the cavity (5), this acts in the direction where air flows into the cavity (5) at the same phase as the displacement direction of the diaphragm.

[0009]

Next, the frequency is lowered, and the air flow directions of the respective ducts with respect to the displacement direction of the speaker unit (3) at the frequency (fob) is explained by means of Figure 3. As shown in the drawing, the air inside the ducts (6, 8) during resonance (fob) based on the acoustic mass whereby the acoustic mass of the duct (8) and the acoustic mass of the duct (6) coincide, and the cavity (5) acts in the direction where the air flow into the cavity (5) in the direction opposite the displacement direction

of the diaphragm. At this time, the air inside the duct (7) is removed from the resonance frequency (foa); therefore, it acts in the direction where air flows out form the cavity (4) at the same phase as the displacement direction of the diaphragm.

[0010]

Figure 4 shows the relationship when the frequency is further reduced. When the diaphragm of the speaker unit (3) is displaced toward the front, the cavity (4) is compressed, and the air inside the ducts (6, 7) acts in the direction from which it flows out of the cavity (4) in relation to the compression quantity. Conversely, with the ducts (6, 8) connected to the cavity (5) under reduced pressure, this acts so that the air flows inside the ducts.

[0011]

In this manner, at a frequency band lower than that of the resonance frequency (fob), the inertance of the duct (6) is reduced and acts as a bypass circuit connecting the cavity (4) and the cavity (5). Therefore, this acts to counteract that sound pressure inside the speaker box (1), the sound pressure form the duct (7) and the duct (8) is reduced, and the unevenness level is reduced. At a frequency band higher than that of the resonance frequency (foa), the inertance of the duct (6) is increased, and there is no influence at all on sound pressure radiation or unevenness with respect to the speaker box (1) of the duct (6).

[0012]

A trial production example is shown next. The resonance frequency (foa) resonating by means of the acoustical circuit of a speaker unit (3) with an opening diameter of 12 cm, a first cavity (4) with a capacity of 1,900 cubic centimeters, and ducts

(6, 7), is 240 Hz. The resonance frequency (fob) resonating by means of the acoustical circuit of a second cavity (5) having a capacity of 12,100 cubic centimeters and ducts (6, 8) is 60 Hz. When a duct (6) with an opening area of 2.54 square centimeters and a length of 13 cm is provided, the sound pressure characteristics are shown by the solid line (9) in Figure 5. When the duct (6) is not provided at this time, the sound pressure characteristics are shown by the dotted line (10) in Figure 5.

[0013]

As shown in the drawings, at lower than the resonance frequency (fob), by providing a duct (6), the degree of attenuation of the sound pressure level becomes significant. In Figure 6, a comparison of the third harmonic distortion characteristics at the time of the sound pressure characteristics of Figure 5 is shown. The solid line (11) shows the distortion characteristics on the embodiment, and it can be seen that the distortion level decreases compared to the a case when there is no duct (6), as shown by the dotted line (12).

[0014]

The first and second passive radiation means and the connection means of the cavity (4) and cavity (5) can be used not only with ducts, but also with passive radiators and the like to obtain acoustic mass.

[0015]

[Results of the Invention]

Based on the present invention as described above, the sound level and unevenness at unnecessary playback bands below low-band cutoff frequencies can be reduced.

[Simple Explanation of the Drawings]

[Figure 1]

This is an abbreviated compositional drawing showing an embodiment of the present invention.

[Figure 2]

[Figure 3]

[Figure 4]

These are explanatory diagrams explaining the aforementioned embodiment.

[Figure 5]

[Figure 6]

These are characteristic diagrams of the aforementioned embodiment.

[Figure 7]

This is an abbreviated compositional drawing showing a conventional example.

[Explanation of Symbols]

1. speaker box

2. speaker installation plate

3. speaker unit

4. first cavity

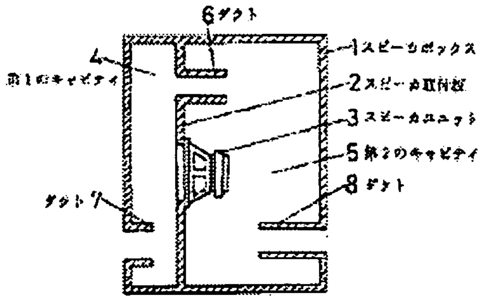
5. second cavity

6, 7, 8. ducts

9, 10. sound pressure characteristics

11, 12. distortion characteristics

【図1】

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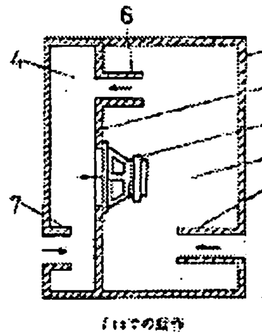


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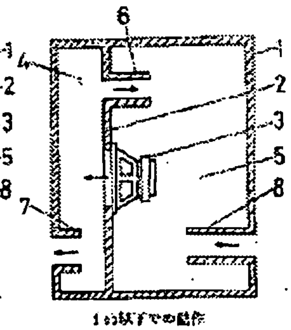


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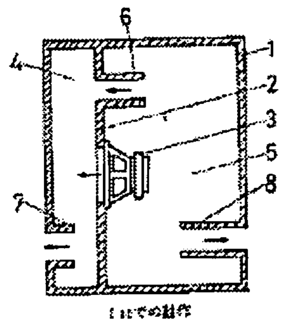


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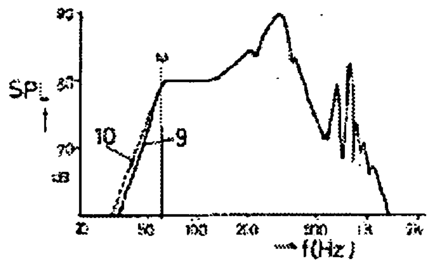


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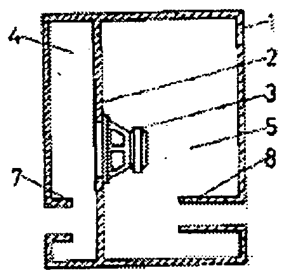
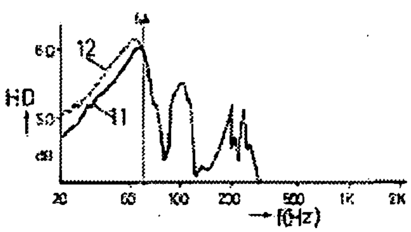



【図6】

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